The role of adverse childhood experiences in suicide among sexual minority undergraduate students

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ABSTRACT

This study explores the rates and odds of adverse childhood experiences (ACEs) and their relationship to suicide attempts in a sample of undergraduate students (n ¹/₄ 924, 71.6% women), comparing lesbian, gay and bisexual (LGB) youth to their heterosexual counterparts. Using propensity score matching, we matched 231 sexual minority and 603 heterosexual participants at a ratio of 1:3, based on gender, age, socioeconomic status, and religious beliefs. Sexual minority participants reported a significantly higher ACE score (M¹/₄2.70 vs. 1.85; t¹/₄4.93; p <.001; d ¹/₄ .391) and higher rates of all but one type of ACEs than their heterosexual counterparts. They also reported a higher prevalence and risk of suicide attempts (33.3% vs. 11.8% respectively, odds ratio¹/₄3.73; p < .001). In logistic regression analysis, sexual minority status, emotional abuse and neglect, bias attack, having a household member with mental health problems, bullying and cyberbullying were significantly associated with suicide attempts. Annually, more than 700,000 people die by suicide, which is the fourth leading cause of death in youthaged between 15 and 29 years (World HealthOrganization [WHO],

2021). Suicide is an extremely complex phenomenon, and we are still far from elucidating its etiology (Cha et al., 2018). Demographically, suicide is highly prevalent across sexual and genderminorities. Their higher risk status is partially attributed to

environmental factors and correlates, namely, their higher rates of adversity in childhood and victimization throughout their lifetime than their heterosexual counterparts (Sahle et al., 2022; Williams et al., 2021). The differential exposure to adversity may be related to social and structural factors that increase the risk of adversity, such as violence based on heteronormativity, societal gender roles, and prejudice promoting violence against sexual minority identity or indicators of such status (Liben & Bigler, 2002).

Western studies carried out with adults have found significant higher rates of adverse childhood experiences (ACEs), such as exposure to domestic violence, physical, emotional and sexual abuse, or household dysfunction, among sexual minority participants thanamong their heterosexual counterparts (Andersen & Blosnich, 2013; Austin et al., 2016). Western studies analyzing the experiences of young people have found that lesbian, gay, bisexual, transgender, and queer plus (LGBTQb) people report higher exposure to ACEs than nonminority populations (Clements-Nolle et al., 2018; Craig et al., 2020). Using a crosssectional cohortstudy, P. M. Hughes et al. (2022) have suggested that exposure to ACEs in the sexual minority populationmay vary across generations. The metaanalytical review conducted by Friedman et al. (2011) found that sexual minorities were 2.9 and 1.3 times more likely, respectively, to experience sexual abuse and parental physical abuse than their nonminority counterparts.

Regarding interpersonal violence by peers and

schoolmates, metaanalytical studies have also shown higher rates of ACEs. Katz-Wise and Hyde (2012) found that people identifying as homosexual or bisexualreported rates of 33% for school victimization and 44% for relational victimization and were, on average, 1.7 times more likely than their heterosexual peers to be victimized in the school context (Friedman et al., 2011).More recently, a metaanalysis of 55 studies conducted by Myers et al. (2020) found a moderate overall mean effect size (*r* ^{1/4} .155) in the relationship between LGBTQ b identification and school victimization. Metaanalyses suggest that sexual minorities are more likely to report higher rates of suicidal ideationand suicide attempts than heterosexuals (Di Giacomoet al., 2018; King et al., 2008; Marshal et al., 2011). Gambadauro et al. (2020) found that sexual minority youth from six different countries in Europe had significantly higher suicidal ideation and previous suicide attempts. Even when accounting for the difference between estimates drawn from population studies and those obtained from LGB community samples in North America and Western Europe studies, sexual minority youth show a higher lifetime prevalence of suicide attempts than heterosexual individuals (Hottes et al., 2016).

Longitudinal prospective studies assessing the consequences of ACEs in later life have found that they predict significant health consequences linked to maladaptive behavior, morbidity, and mortality (K. Hughes et al., 2017). ACEs also increase the risk of mental disorders and negative health conditions suchas cancer and cardiovascular disease over the life course (Bellis et al., 2019; Petruccelli et al., 2019). Among these health risks, the review of Sahle et al. (2022) has identified that suicidality is consistently associated with ACEs in retrospective reports. Prospectively, few studies have analyzed the association between suicidality and ACEs, but they do confirm that there is a link. Thompson and Kingree (2022) have found that physical, sexual, and emotional abuse together with parental incarceration and family history of suicide attempts are predictors of seriously considering suicide.

Studies to date have been conducted mainly in the

United States and Canada. Thus, there is a need to examine the range of ACEs faced

by sexual minorities other regions and determine their association with suicide. To this end, the current study pursues threemain objectives. First, it seeks to comprehensively explore the rates of ACEs at the individual, family,peer, and community level in a sample of lesbian, gay, and bisexual (LGB) youth. Second, it seeks to compare the ACE rates and odds between LGB and heterosexual participants. Third, among all categories of ACEs, it seeks to examine which ones are associated with suicide attempts.

Methods

Participants and procedure

The sample for this crosssectional selfreport retrospective study, which was carried out between 2019 and 2020, was drawn from the student body of theUniversity of Barcelona (UB). Ethical approval for the research was obtained from the UB's Bioethics Commission (IRB 00003099). To conduct the study, wecontacted the undergraduate studies coordinators in all bachelor's degrees to obtain their consent to administer the survey. From a total of 73, 48 agreed to participate. Then, we randomly selected one group per participating bachelor's degree and administered the survey inthe classroom. All students voluntarily agreed to participate. We collected a nonprobabilistic sample of 1291 individuals, all over the age of 18. Participants who did not complete at least 60% of the survey were removed (*n* ¼ 273). To reach a balanced distributionbetween sexual minorities (exposed group) and heterosexuals (unexposed group), we applied a 1:3 matching for propensity score (PSM, Rosenbaum & Rubin, 1983) to 1018 cases. This method calculates the probability of each participant belonging to the exposed or unexposed group according to relevant variables. We used the nearest neighbor method through the package MatchIt in R (Ho et al., 2011) and

matched on gender, age, socioeconomic status (SES) and religious beliefs. Then, PSM used the probability to pair each sexual minority individual with three heterosexual subjects of similar characteristics based on the selected variables. Once applied, any heterosexuals who could not be matched (n ¹/₄ 70) or who had missing data in the selected variables (n ¹/₄ 24) were excluded. Thus, the final sample consisted of 924 undergraduate students (M 20.10 years old; SD 3.34).

All participants were cisgender, 71.6% were women

and 28.4% men. No trans, nonconformity, or nonbinary identities were recorded. A quarter of the participants ($n \frac{1}{4}$ 231) identified as nonheterosexuals (i.e., lesbian, gay, bisexual, asexual, and questioning). Thus, the sexual minority group comprised individuals who identified as nonstraight (25%). Participants' sexual orientation was heterosexual ($n \frac{1}{4}$ 693, 70.4% women), homosexual ($n \frac{1}{4}$ 47, 51.1% women), bisexual($n \frac{1}{4}$ 171, 88% women), asexual ($n \frac{1}{4}$ 3, 66.7% women), and questioning ($n \frac{1}{4}$ 10, all women). Table 1 compares the sociodemographic characteristics of the two groups (heterosexual and sexual minority).

Measures

We designed a selfadministered survey based on the ACE framework. It has three sections and is based on the Adverse Childhood Experiences International Questionnaire (ACE-IQ; WHO, 2017a), the Family Health History questionnaire (Felitti et al., 1998), and previous ACE studies (Bellis et al., 2014; Ford et al., 2016). We analyzed the ACEs following the guidance for ACE-IQ in its frequency version (WHO, 2017b).

The first section, "personal information" contains sociodemographic questions on gender identity, sexual orientation, age, region of origin, religious beliefs and

socioeconomic status (SES). To capture participants' gender identity and sexual orientation, we included three selfreport questions as recommended by the Williams Institute's Gender Identity in US Surveillance Group (GenIUSS Group, 2014). The second section, "health questions," covers health behaviors and outcomes. We used one item to measure lifetime suicide attempt, "have you everattempted to commit suicide?," possible answers were 1 (never), 2 (once), 3 (a few times), and 4 (many times). For the analysis, we created a suicide attempt dummy variable. Responses of one or more suicide attempts were considered endorsements. Reliability for health section was acceptable (*a* 0.81).

	Table	1.	Participants'	sociodemographic	features b	y sexual	orientation
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		%Heterosexual	%Sexual minority	
Variables	%Total	(n = 693)	(n = 231)	Statistics
Gender				$X^{2}(df) = 8.96(1), p = .003; \varphi_{c} = .099$
Male	250 (27.1)	205 (29.6)	45 (19.5)	
Women	674 (72.9)	488 (70.4)	186 (80.5)	
Age M (SD)	19,85 (3.34)	19.9 (3.44)	19.6 (2,99)	$U = 73,342.00, p = .047; r_{rb} = .084$
Origin				$X^2(df) = 1.23(3), p = 0.747$
Europe	853 (92.3)	638 (92.1)	215 (93.1)	
Asia	16 (1.7)	11 (1.6)	5 (2.20)	
Africa	7 (0.8)	6 (0.9)	1 (0.4)	
America	48 (5.2)	38 (5.5)	10 (4.3)	
Religious				$X^{2}(df) = 9.43(4), p = .051; \varphi_{c} = .101$
Christian	105 (11.4)	88 (12,7)	17 (7.4)	
Islam	7 (0.8)	6 (0.9)	1 (0.4)	
Hindu	2 (0.2)	1 (0.1)	1 (0.1)	
Buddhist	2 (0.2)	2 (0.3)	0 (0.0)	
No	808 (87.4)	596 (86.0)	212 (91.8)	
SES				$X^{2}(df) = 10.80(2), p = .005; \varphi_{c} = .108$
Low	337 (36.5)	232 (33.5)	105 (45.5)	
High	116 (12.5)	90 (13.0)	26 (11.2)	
Low	337 (36.5)	232 (33.5)	105 (45.5)	

Notes: Sexual minority vs heterosexual. $\chi^2(df)$ = Chi-squared(degrees of freedom); φ = Cramér's V; U = Mann–Whitney U; r_{rb} = rank-biserial correlation.

The third section, "ACEs," is a 29item measure that covers 13 domains of adverse events before the age of

18. Household member with substance use (one item); household member with mental health problems (one item); incarcerated household member (one item); parent/s dead, separated or divorced (two items); household member treated violently (three items); emotional abuse (two items); physical abuse (two items); contact sexual abuse (four items); emotional neglect (two items); physical neglect (three items); bullying (one item); community violence (three items); and collective violence (four items). To achieve a more comprehensive view of adversity, we added two additional domains: cyberbullying (one item) and bias attack (one item). The first was taken from the *Juvenile Online Victimization Questionnaire* (JOV-Q, Montiel &Carbonell, 2012), and the second from the *Juvenile Victimization Questionnaire* (Pereda et al., 2018). We thus provide an expanded ACE score over 15 domains, rather than the 13 of the original ACE-IQ. Cronbach's alpha for this sample was acceptable (*a* ¼ 0.76).

Analytical strategy

Participants were classified into two groups, heterosexual and sexual minority, depending on the endorsement of sexual orientation and identity items. First, we examined the rates of ACEs comparing sexual minorities and heterosexual participants. To test the extent of the 15 ACE domains across the sample and the differences between the two groups, descriptive and bivariate analyses were run. We compared the mean ACE score across the sexual minority and heterosexual groups through Welch's t test (t) and Cohen's d(d) for effect size. The lifetime rate of each ACE between heterosexuals and sexual minorities was compared using Chisquare (X^2) and odds ratio (OR). After testing the preliminary bivariate analyses, we ran various binomiallogistic regressions to test the relative contribution of sexual minority status, as well as each of the 15 ACE categories, to suicide attempts. We used hierarchicalmodel building to add independent variables in blocks which allowed us to assess whether the sexual minority status estimate changed both separately and simultaneously, as well as to test the effect of each ACE on suicide attempts. The models were selected based on the parsimony and best fit for the data using the car (Fox& Weisberg, 2019) and Ime4 (Bates et al., 2015) packages. Multicollinearity and Tolerance was assessed through variance inflation factors (VIF) showing that the criteria to rule them out were met. All other assumptions were visually inspected and confirmed. We set the *p*-value at 5%. We conducted the analysis with the R program version 4.2.2 (R Core Team, 2022).

Results

Adverse childhood events

The distribution of mean ACE scores comparing sexual minorities and heterosexual

participants by gender was as follows: heterosexual men ($M \frac{1}{4} 1.87$, $SD \frac{1}{4} 2.05$), heterosexual women ($M \frac{1}{4} 1.84$, $SD \frac{1}{4} 1.94$), sexualminority men ($M \frac{1}{4} 2.67$, $SD \frac{1}{4} 2.14$), and sexual minority women ($M \frac{1}{4} 2.71$, $SD \frac{1}{4} 2.42$). When we analyzed differences in the ACEs between the two overarching groups, sexual minorities showed significantly higher scores than their heterosexual counterparts (heterosexual group [$M \frac{1}{4} 1.85$, $SD \frac{1}{4} 1.97$]; sexual minority group

 $[M^{\frac{1}{4}}2.70, SD^{\frac{1}{4}}2.36]; t^{\frac{1}{4}}4.93; p < .001; d^{\frac{1}{4}}.391).$ By

number of ACEs, the sexual minority group rates were 16.9% for zero ACEs, 20.3% for one ACE, 18.2% for two ACEs, 13.0% for three ACEs, and 30.7% for fouror more ACEs, while the heterosexual group rates were 30.3% for zero ACEs, 24%, for one ACE, 16.9% for two ACEs, 11.3% for three ACEs, and 17.6% for four or more ACEs.

The lifetime rates of each ACE and the ORs appear

in Table 2. As the table shows, the rates for sexual minorities ranged from 0.9% (for community violence) to 25% (for bullying). For all types of ACEs, except for community violence, the rate was higher in the sexual minority group than in the heterosexual group. At the individual level, the risk for emotional abuse, sexual abuse, emotional neglect and bias attack were significantly higher for sexual minorities than for heterosexuals. At the family level, the risk of beingexposed to a household member with mental health problems or a household member treated violently was significantly higher among sexual minorities. No differences were found between the groups across the remaining forms of family victimization. At the peer level, the risk for bullying victimization was significantly higher among sexual minorities, but there were no differences in cyberbullying victimization. Nor were differences found between groups at the community level.

Suicide attempt among sexual minorities

We examined whether the rate of suicide attempts was higher among sexual minorities. Sexual minorities reported a significantly higher rate and likelihood of suicide attempts. Specifically, attempted suicide was almost 3 times higher in sexual minorities than in heterosexuals (33.3% vs. 11.8% respectively, OR 3.73 [2.61–5.33]; p < .001). To examine the relationship between sexual minority status, ACE categories and suicide attempts, we conducted a series of logistic regressions using hierarchical model building. First, we ran an initial modelin which sexual minority status was the only independent variable explaining suicide attempts. Then, we estimated the effect of each ACE as an independent variable explaining suicide attempts. For parsimony, we kept only the significant variables in the final regression model that appears in Table 3. As shown, the size of ORs for sexual minority status fell frommodel to the best model when ACEs were included in the regression and the final solution was selected. Nonetheless, being a sexual minority (OR 2.98; p < .001) was still significantly related to attempted suicide. Five ACEs were also significantly associated: emotional abuse (OR = 2.30; p < .001), emotional neglect (OR e =1.74; p = .0014), bias attack (OR = 1.83; p = .043), household member with mental health problems (OR = 2.02; p < .001), bullying (OR = 1.78; p = .007), and cyberbullying (OR = 2.69; p=.013).

Table 2. Lifetime rate of ACEs.

			Lifetime	rates	
Level	ACE	Total	Hetero	Sexual minority	OR (CI 95%; p value)
Individual	Emotional abuse	12%	9%	20%	2.47 (1.64–3.72); p = <.001
	Physical abuse	13%	12%	16%	1.33 (0.88–2.02); p = .181
	Sexual abuse	21%	18%	31%	2.10 (1.49–2.95); p = <.001
	Emotional neglect	19%	17%	25%	1.64 (1.15–2.34); $p = .006$
	Physical neglect	3%	3%	4%	1.35 (0.58–3.14); p = .491
	Bias attack	8%	6%	14%	2.58 (1.59–4.19); p = <.001
Family	Household member with substance use	17%	16%	19%	1.17 (0.80–1.73); p = .417
	Household member w/ mental health problems	29%	26%	36%	1.60 (1.17–2.20); p = .003
	Incarcerated household member	2%	2%	3%	1.41 (0.57–3.51); <i>p</i> = .455
	Parent/s dead, separated or divorced	30%	29%	32%	1.10 (0.80–1.53); <i>p</i> = .534
	Household member treated violently	17%	15%	22%	1.58 (1.09–2.39); p = .016
Peer	Bullying	25%	21%	36%	2.07 (1.49–2.86); p = <.001
	Cyberbullying	4%	3%	5%	1.34 (0.65–2.76); p = .432
Community	Community violence	0.9%	0.9%	0.9%	1.00 (0.20–4.99); <i>p</i> = 1.000
	Collective violence	7%	6%	9%	1.47 (0.84–2.52); p = .172

Note: Sexual minority vs heterosexual.

Table 3. Logistic regression analysis examining the influence of sexual minority status and ACEs on suicide attempts.

Predictors	OR (CI 95%)	p
Suicidal attempt		
Model 1 ($R^2CS = .053$; $R^2N = .088$; $\chi^2(df) = 50.6(1)$; $p < .001$)		
Sexual orientation ^a	3.73 (2.61-5.33)	<.001
Best model ($R^2CS = .136$; $R^2N = .227$; $\chi^2(df) = 135.3(7)$; $p < .001$)		
Sexual orientation ^a	2.98 (2.03-4.34)	<.001
Emotional abuse	2.30 (1.40-3.78)	<.001
Emotional neglect	1.74 (1.12–2.71)	.0014
Bias attack	1.83 (1.02-3.29)	.043
HH mem. w/MH problems	2.02 (1.38-2.97)	<.001
Bullying	1.78 (1.17-2.71)	<.007
Cyberbullying	2.69 (1.23-5.90)	.013

Notes: $R^2CS = Cox-Snell R^2$; $R^2N = Nagelkerke R^2$; $\chi^2(df) = \chi^2(degrees of freedom)$. ^aSexual minority = 1; heterosexual = 0.

Discussion

Suicide attempt is associated with a myriad of risk factors and correlates (Cha et al., 2018). We investigate suicide attempts and their association with ACEs, and find that the importance of ACEs in individuals' suicide outcomes is undeniable (K. Hughes et al., 2017). We find significantly higher rates of ACEs and substantially increased suicide attempts in young adults from sexual minorities. In addition to experiencing stigma in multiple life domains, which is a fundamental driver of health inequalities (Hatzenbuehler et al., 2013; Pachankis et al., 2021).

The broad set of analyzed ACEs, which has been expanded to encompass bias attack and

cyberbullying, includes adversities resulting from a minority position as well as general forms of victimization. Among the different forms of interpersonal victimization, those based on stereotypes, prejudice, negative attitudes, hostility, or hatred seem to be common in minority groups; and are characterized by being qualitatively different from other types of violence (Díaz-Faes & Pereda, 2022). This type of biasbased violence is also embedded in peer victimization experiences of sexual minority youth, such as bullying grounded on heteronormativity, homophobia, biphobia, and transphobia. Unsafe and hostile school environments may triggeror exacerbate health problems in sexual minorities (Rivers, 2017). Overall, bias victimization contributesto the maintenance and proliferation of stigma against sexual minorities (Herek et al., 2007).

ACEs occur against the backdrop of structural inequalities and health disparities owing to the persistent stigma directed at minorities, as the minority stress model explains (Meyer, 2003; Meyer & Frost, 2013). At the same time, they interact with the person's individual, interpersonal, and ingroup position. Stigma is contingent on access to social, economic, and political power. Link and Phelan's (2001) comprehensive conceptualization of stigma helps to understand how the converging elements of stereotyping, labeling, exclusion, status loss, and discrimination act together in a power situation, allowing stigma to develop. Thus, as the review by Hatzenbuchler and Pachankis (2016) explain, stigma and minority stress can impair health through a range of mechanisms such as vigilance, rumination, loneliness, and physiologic functioning related to the stress response. The performance of these mechanisms helps to understand the underlying process that explains and leads to an increased risk of mental and behavioral problems such as suicide among sexual and gender minority populations.

The robust differences found between the sexual minority and heterosexual groups in

most forms of victimization corroborate the results of metaanalytical reviews (Fedewa & Ahn, 2011; Friedman et al., 2011; Katz-Wise & Hyde, 2012; Myers et al., 2020; Toomey & Russell, 2016) suggesting that sexual minorities experience more victimization of all kinds. Additionally, adverse experiences may go beyond the victim and have an indirect impact on members of the community by promoting intergroup threat and victim guilt (Paterson et al., 2019).

In line with previous studies (McLaughlin et al., 2012), our results show that sexual minority status and some ACEs are associated with suicide attempts. We identified that having a household member withmental health problems, emotional abuse, emotional neglect, bias attack, bullying, and cyberbullying are associated with suicide attempts. A recent review (Wang et al., 2023) addressing the factors associated with suicide attempts among sexual minority youth showed that youth who reported higher levels of family rejection were more likely to report having attempted suicide. Concerning victimization, the most important factor was bullying, although physical and sexual abuse were also risk factors to consider. Sexual abuse was not significantly associated with suicide attempts in our study. The association between sexual abuse in early life and suicide has been previously supported (Ng et al., 2018). Nevertheless, child sexual abuse is a general and nonspecific risk factor for suicide (Maniglio, 2011). It is a complex process involving multiple variables, such as family dysfunction, other forms of maltreatment and some mental health problems, that may either act independently or interact with child sexual abuse to increase the risk of suicide in abuse victims (O'Brien & Sher, 2013). This intricate interaction of variables deserves further attention in sexual minority studies but is not addressed in the present study.

The study has several limitations. First, the sexual minority group was identified through

the sexual orientation of the participants, and mostly comprised bisexual women. Only cisgender participants were identified. The gender identity question did not yieldany individuals selfidentifying as transgender, gender nonconforming or nonbinary. There may be several reasons for this, among them the complexity of the issue of identity, the lack of diversity in the college sample, the use of nonprobabilistic sample or a reporting bias (Galupo et al., 2015). Second, the study design implies that the results are neither generalizable norrepresentative. Third, retrospective selfreports are subject to response or recall bias and we cannot distinguish the temporal order of the variables. Fourth, we measured suicide attempts through a single item, so we could not assess its reliability and validity. Fifth, owing to the composition of the sexual minority sample, we evaluated them as a whole group, which does not allow us to account for any ingroup differences that may exist. Despite the limitations, however, the present study lays the groundwork and adds cultural contextfor future research using prospective designs and controlled matched groups of nongender and nonsexual minority groups to explore causal inference. Future studies should also focus on the experiences of resilience that sexual minorities deploy to mitigate or cope with the effects of ACEs. Resilience factors such as social, family, and institutional support, empowerment of sexual minorities and individual acceptance and selfaffirmation may have differential characteristics in LGBTBQ populations and should be examined in greater depth.

In conclusion, we have identified an association between the detrimental effects of ACEs on suicide attempts in sexual minority youth and confirmed previous findings in a different population and setting. We have found that sexual minority status is still the variable most significantly associated with suicide attempts. Given the increased risk of suicidality and the high rates of childhood adversity experienced by sexual minority populations, there is a clear need to design early and effective interventions and to eradicate prejudices and discrimination against them.

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Data availability statement

Data are available upon reasonable request to the corresponding author.

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